Final Exam Rubric

ECE 345/ME 380
Fall 2020
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1. not in standard form −2.

2. Sign error (c) −1.

3. (d), aft (b) −5.
   sign error consistent w/ #2 −0
   (b), (c), & (d) −3

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1. Must show need for $N=1$
   or calc N for all 3 to get 2.

   Mis-labeling N as P, but correct answer & correct understanding of Nyquist −1

2. Stable via Routh-Hurwitz, but NOT Nyquist −5
   Wrong crossing of imag axis −4
   (both incorrect) −7

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1. look for: matching coefficients
   · $T_s \geq 1$ + $w_n \geq 4$
   · input answer
   accidentally flipped inequality −2

2. Algebraic solve, no connection w/ T_s + w_n geometric constraints. −5

   Missing w_n, geometrically. −4

   T_s inequality wrong −1.

   All of the above incorrect −8.

3. A, irrespective of explanation: +1
   B, w/ justification +3
   w/out justification +1
   C, poor justification (not tied to trans. response specs) +6
   mostly right justification +8
   D, choosing overdamped + ignoring transient response. +4
   poor/no justification +1

4. 3-4-1-2 (damping incorrect) +10/15

   3-2-4-1 (underdamped incorrect) +12/15

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1. No deductions if solved for unit ramp.

a) not simplified. −0/5

forgot K in K_p calc. −2/5

calc K_v instead of K_p −4/5

b) calc. K_p, instead of K_{ramp} (for unit step input) −4/5

calc. K_v w/ type 1 assessment. −4/5

For a+b): type # assessed from closed-loop system: −4/10.

2. a) $k > -4$ no deductions /5

3rd order Hurwitz cond, not 2nd −3/5

b) mis-interpretation of 0 in Routh table −3/5

3. No consideration of stability +2/5

$\frac{K}{s}$ w/ ss error better, & still stable. +5/5.

Ctroller K b/c stable always & ok ss error +5/5

4. Right mathematics, but no discussion of increasing K.

Mis-interpret ↓ response as bad. +3/10.

Calculate ss error, not ss response −2/10.

Calculate ss response, interpret as ss error +2/10.

+6/10.

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1. a) No $|sI-A|=0$ +1/5

Computed as denominator to $G(s)$ 1/5.

b) No $c(sI-A)^{-1}B+D$ +1/5

Algebraic error +3/5

Slight steps $\frac{-1}{s+3}+\frac{1}{s+1}=\frac{2}{(s+1)(s+3)}$ +3/5

more slipped +~~2~~/5.

2.

3. Correct G_M + ϕ_M, but no visual esph. -3

or indication of ω_{GM}, ω_{PM}

4. No calculations — just hand waving -4.